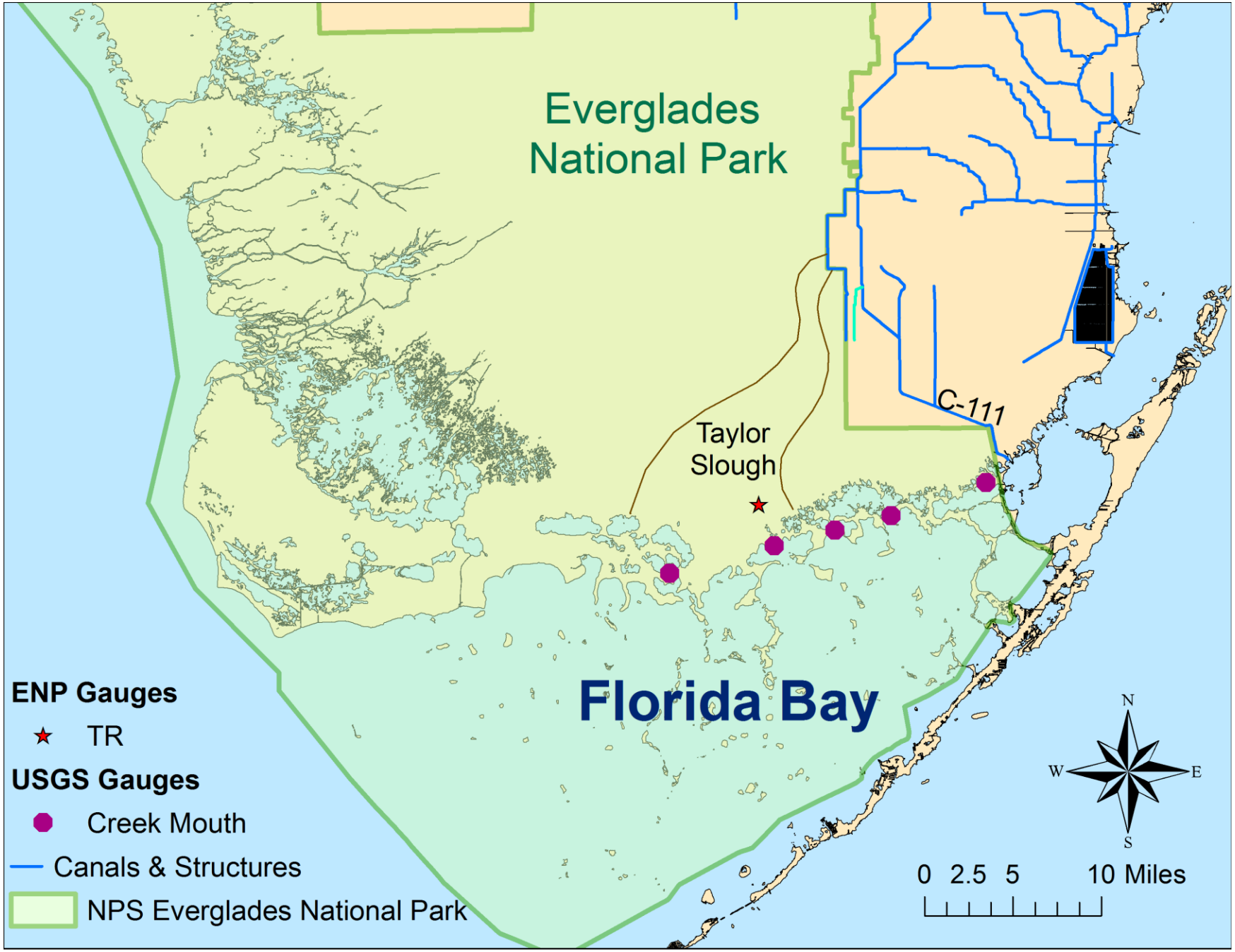
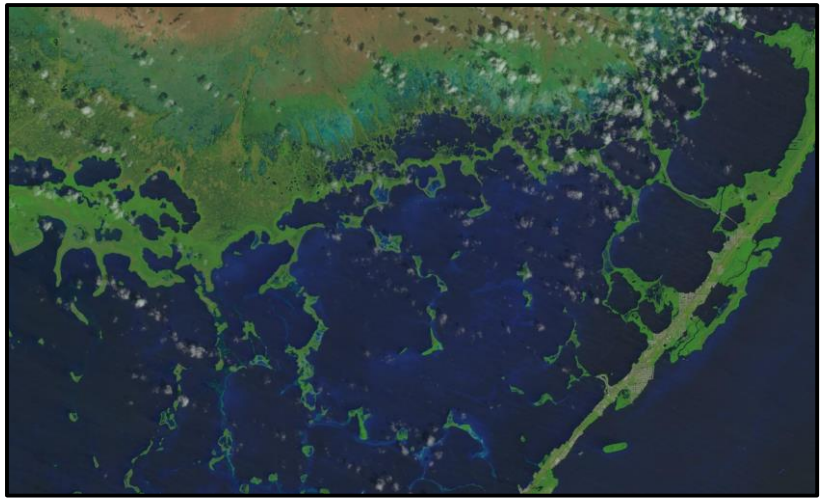
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Florida Bay Current Conditions: Another Perfect Storm?

Fred H. Sklar, Ph.D., Section Administrator
Everglades Systems Assessment
September 3, 2015


Everglades
National Park
C-111
Taylor
Slough
Florida Bay
ENP Gauges
TR
USGS Gauges
Creek Mouth
Canals & Structures
NPS Everglades National Park
N
W
E
S
0 2.5 5 10 Miles

Florida Bay Ecology

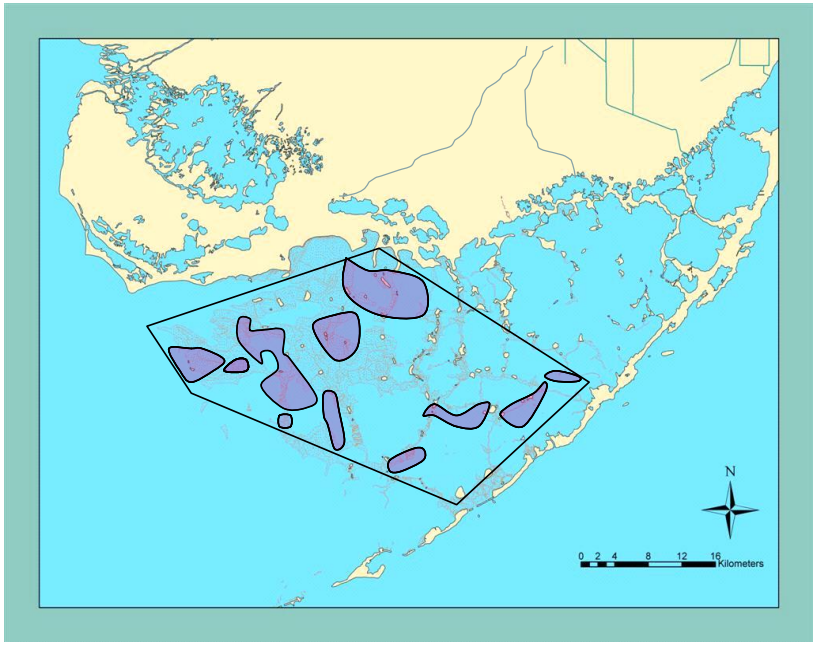


- Everglades discharges are greatest in northeastern Florida Bay
- Extensive seagrass meadows are important nursery grounds for recreational fisheries
- Basins are separated by an extensive network of mud banks
- Florida Bay salinity reflects a long term flow signal and a short term rainfall signal

Florida Bay Seagrass Die-Off

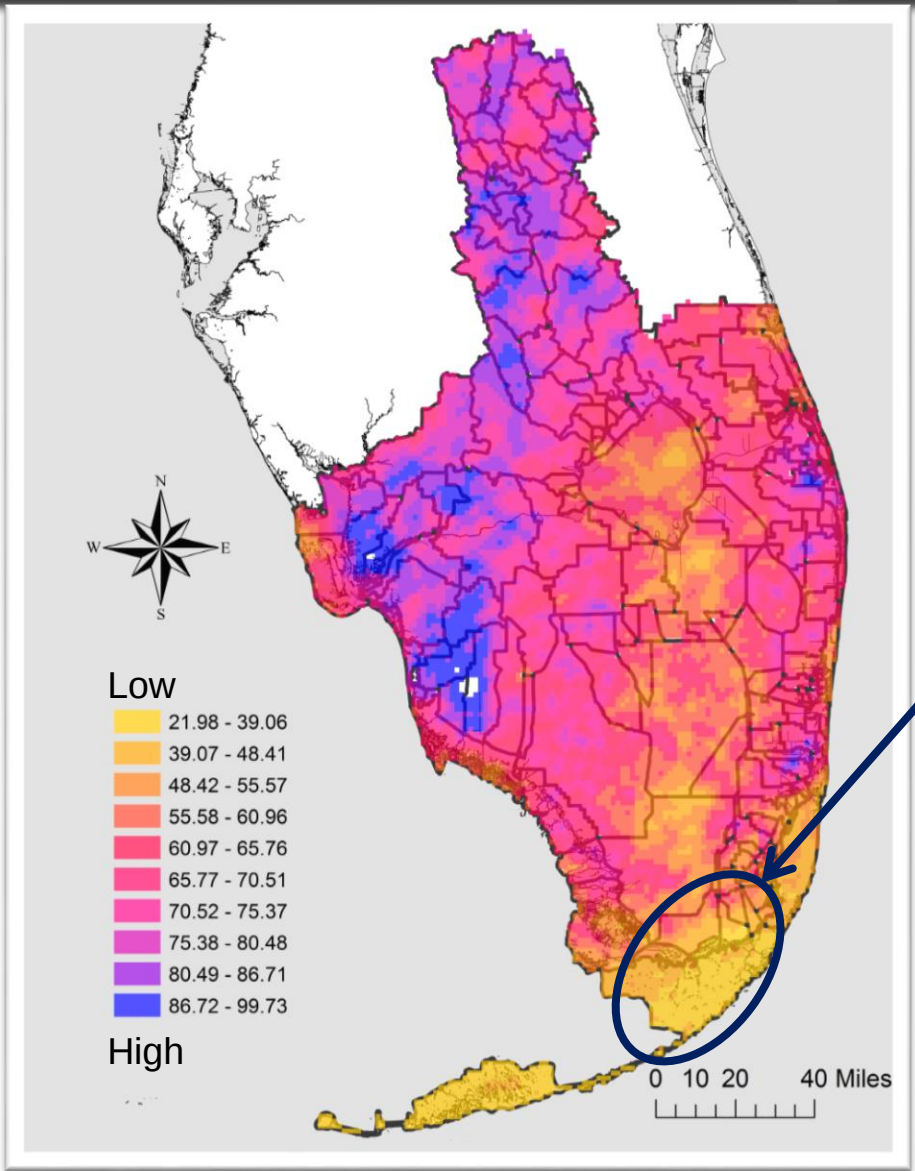
- Drought, hypersalinity, sulfide, hypoxia triggered seagrass dieoff in 1987; nearly 10,000 acres died in the central and western bay
- Almost 60,000 more acres of critical habitat were damaged with reduced productivity and biomass
- Die-off impacts lasted for 2 decades and included: reduced water clarity, increased nutrients, algae blooms, impaired fisheries
- Better conditions had returned with healthy seagrasses and clearer water
- However lack of fresh water has left the bay vulnerable to drought

At 500,000 acres Florida Bay has one of the largest seagrass meadows in the world.



Stippled areas affected by severe loss of seagrass in 1987

District Rainfall Distribution WY15 & WY16



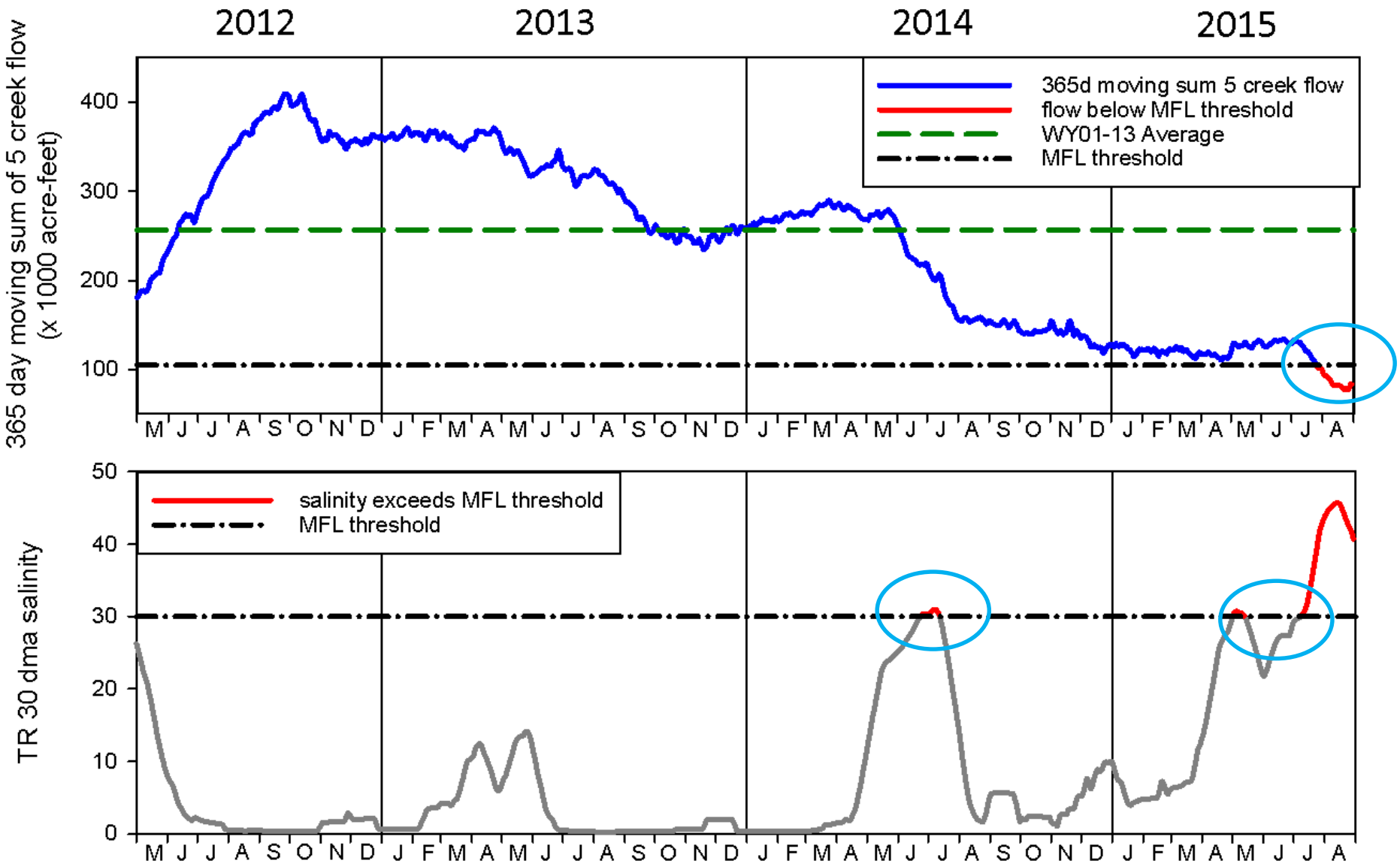
Radar estimated <u>total</u> rainfall from May 2014 through August 2015 show that

<u>Taylor Slough and Florida Bay</u>

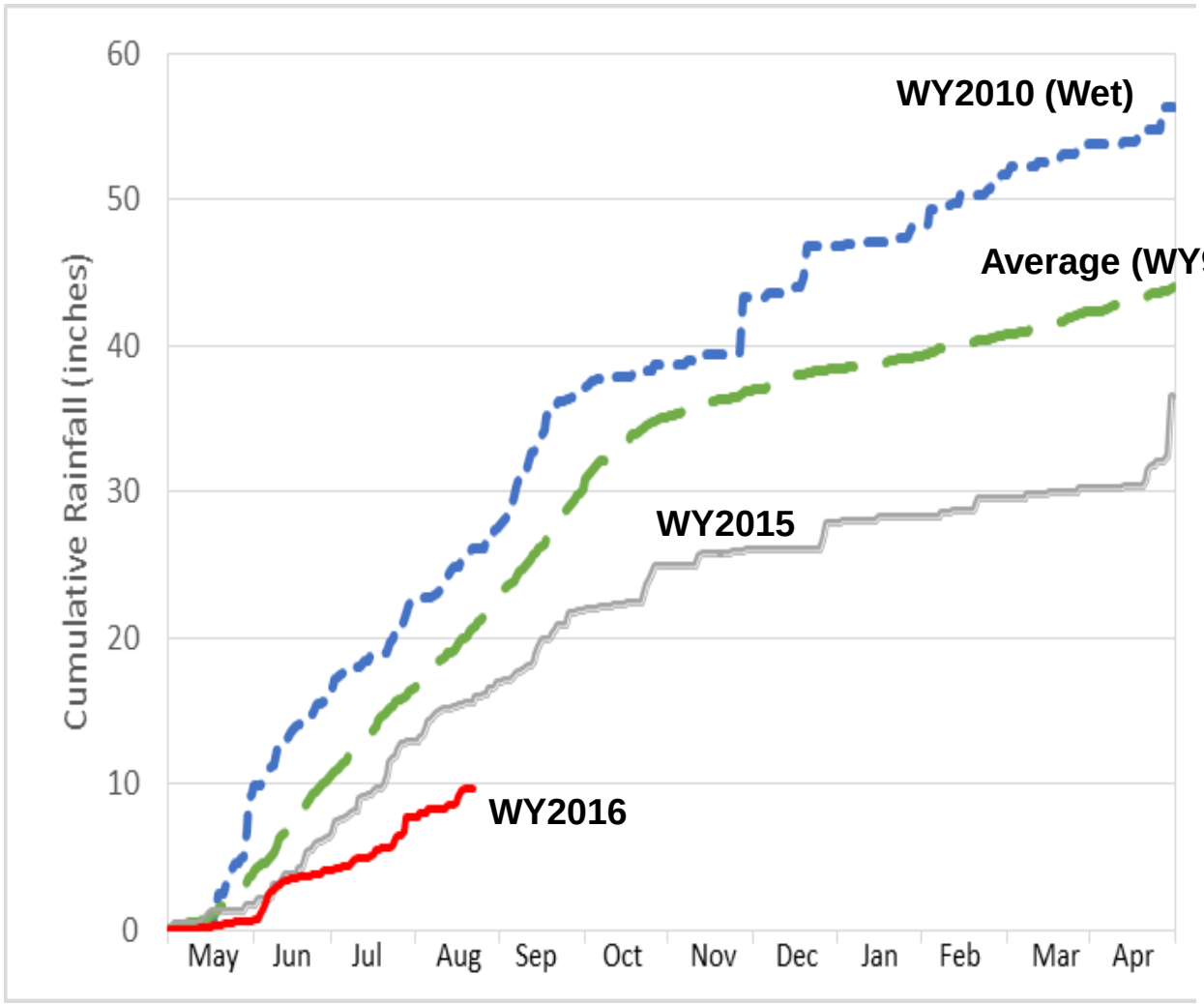
received the lowest amounts of rainfall (25-35 in) compared to the rest of the SFWMD (80-90 in)

Florida Bay Minimum Flow & Level

- Adopted in 2006; Re-evaluated in 2014
- Exceedance defined as either:
  - 30 day moving average salinity of greater than 30 psu at sentinel site of Taylor River in Everglades National Park
  - 365 day moving sum of cumulative flow from 5 monitored creeks feeding Florida Bay is less than 105,000 acre-feet
- Violation = exceedances in 2 back to back calendar years twice within a 10 year period
- MFL is designed to be protective for conditions up to a 1 in 10 year drought

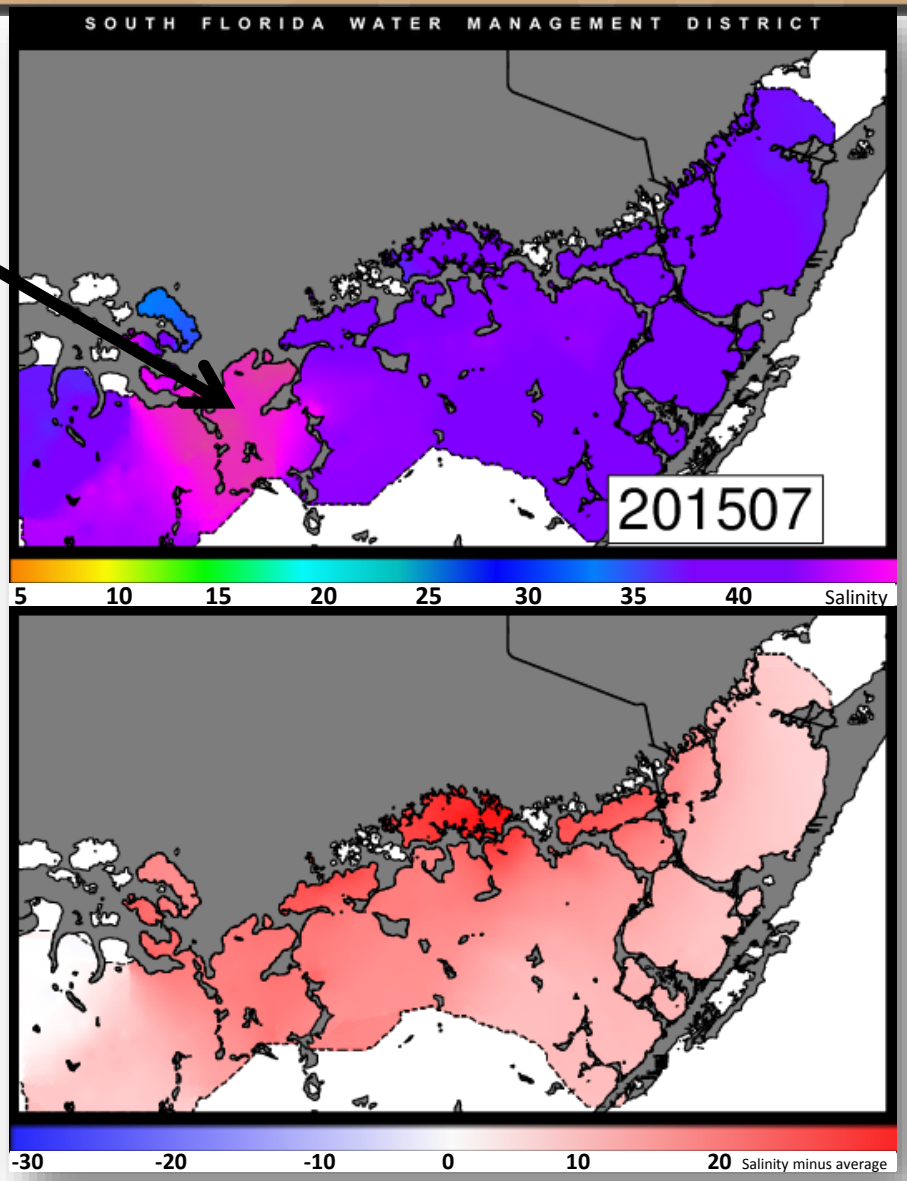

2012
2013
2014
2015
365 day moving sum of 5 creek flow (x 1000 acre-feet)
400
300
200
100
365d moving sum 5 creek flow
flow below MFL threshold
WY01-13 Average
MFL threshold
M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A
TR 30 dma salinity
50
40
30
20
10
0
salinity exceeds MFL threshold
MFL threshold
M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A

Rainfall Deficit



Mapping Florida Bay Salinity

> 50 Practical Salinity Units (psu)



Late July 2015

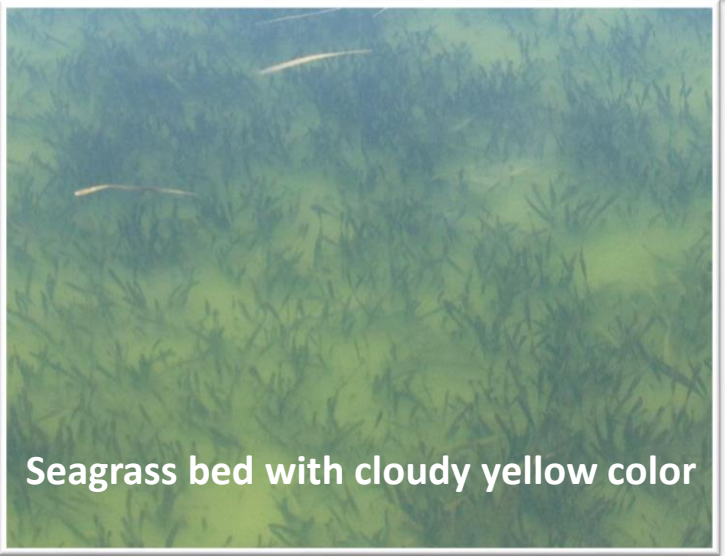
Difference from 2006 – 2014 Average (Jun – Aug)

Current Ecological Conditions in Florida Bay

- Distinct patches of dead seagrass
- Little to no SAV in the mangrove creeks

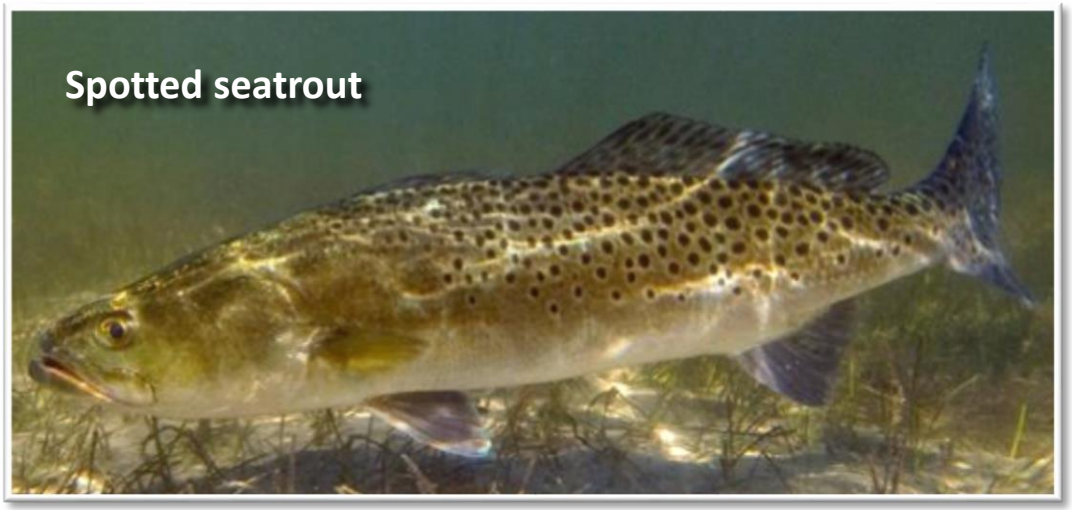
Large floating rafts of dead seagrass - not typical in the bay

Current Ecological Conditions in Florida Bay

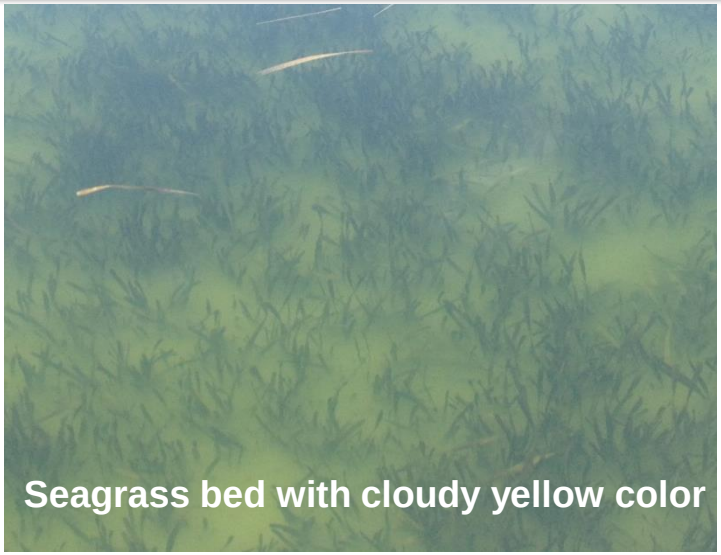

Seagrass bed with cloudy yellow color


Healthy seagrass bed

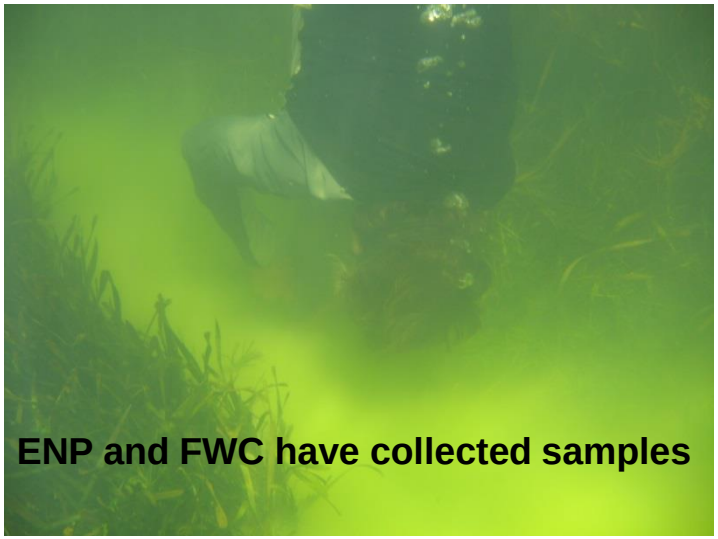
- Areas of yellow cloudy water within SAV beds with very low dissolved oxygen and high sulfur
- Low sport fish numbers (cannot be wholly attributed to recent hypersalinity)


Spotted seatrout

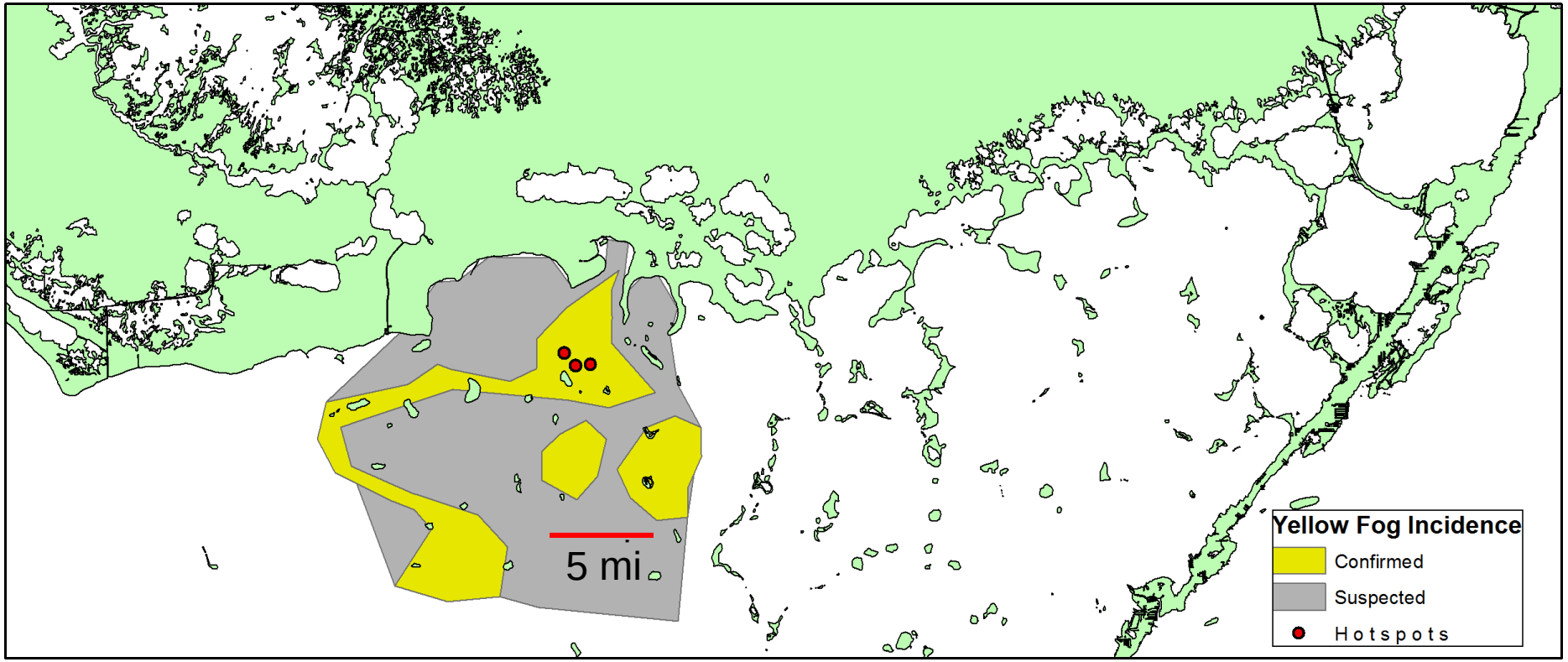
Current Ecological Conditions in Florida Bay



Central Florida Bay "yellow fog" is currently under investigation



Location of Yellow Fog

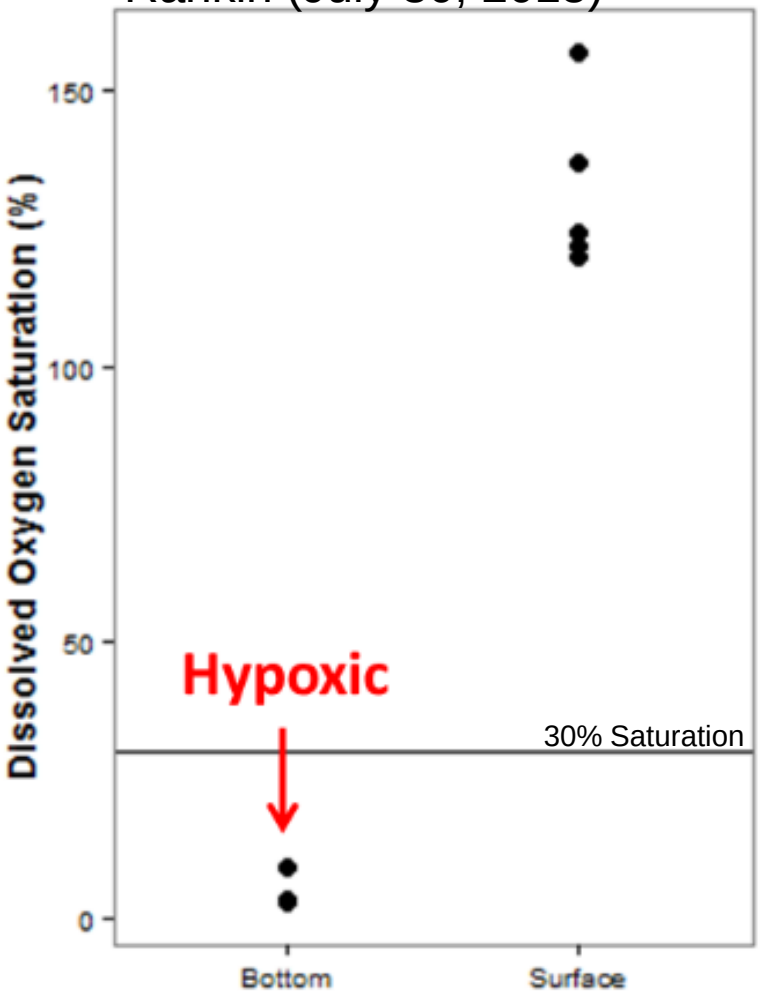


Sediment Porewater Sulfide (> 2.0 mM is toxic to Thalassia)

Basin, Location, Condition	Rhizome Depth- B Core Segments		
	Mean	StdDev	Cores
All Cores, All Locations	**3.0**	**2.0**	**48**
Johnson Key Basin- All Cores	**2.9**	**1.6**	**18**
Bank Edge Site- All Cores	2.4	0.5	6
Live Thalassia	2.4	0.5	6
Basin Site- All Cores	3.2	1.9	12
Live Thalassia	2.4	1.5	8
Sick Thalassia	4.7	1.6	4
Rankin Lake- All Cores	**5.0**	**2.1**	**14**
Depressions with Yellow Fog	3.9	2.1	6
Sick Thalassia	5.8	1.7	8
Roscoe Key Bank Sick Thalassia	2.5	0.7	4
Sunset Cove Healthy Thalassia	**1.1**	**0.1**	**4**
Whipray Basin- All Cores	**1.2**	**0.6**	**8**
Bare Areas	1.5	0.7	4
Sick Thalassia	0.9	0.1	4

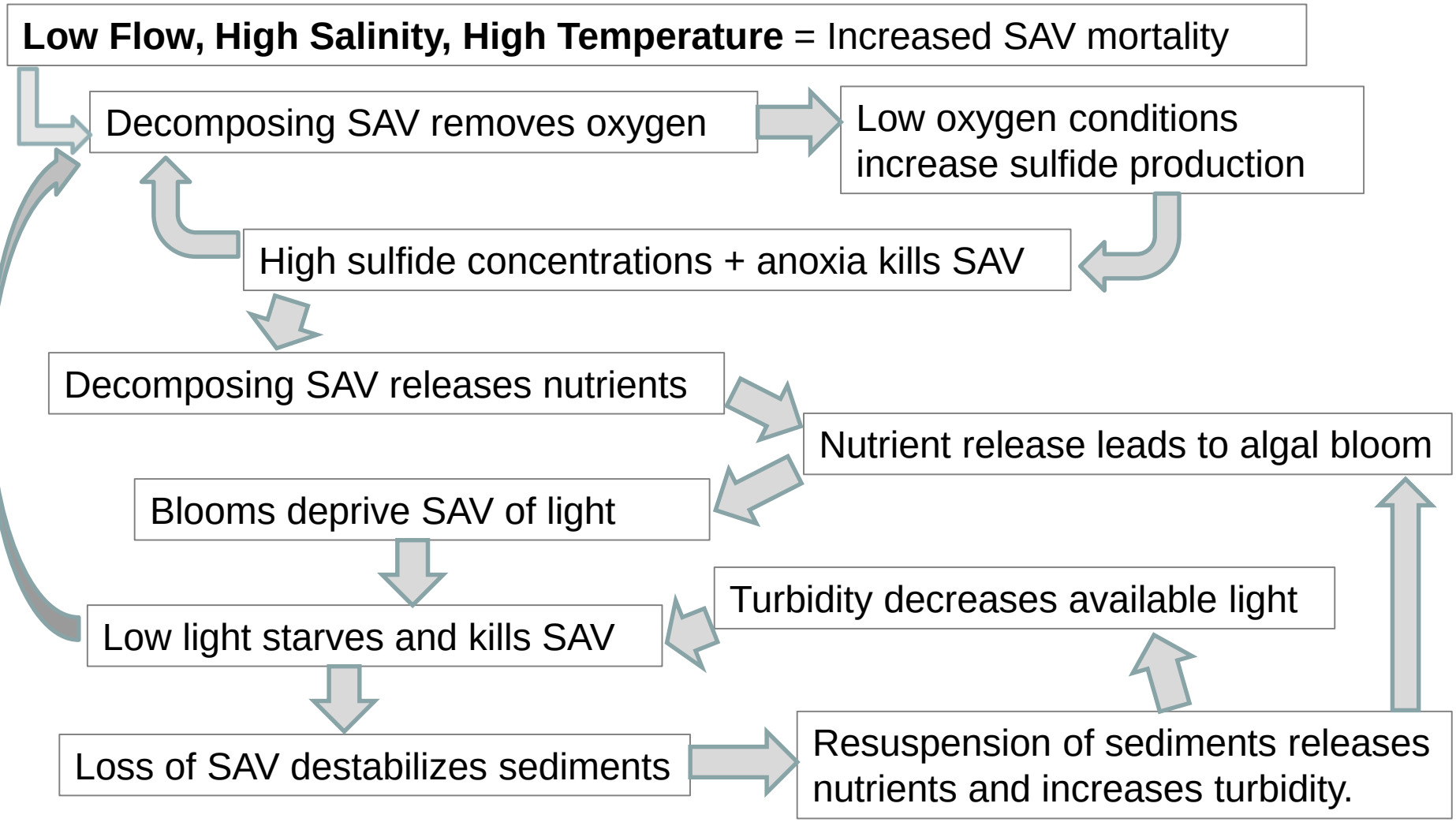
Low Dissolved Oxygen in Central Bay

Rankin (July 30, 2015)



Toadfish are bottom dwelling. The Toadfish kill in central Florida Bay, observed on July 22, was likely due to hypoxia.

The "Perfect Storm" Cascade Hypothesis



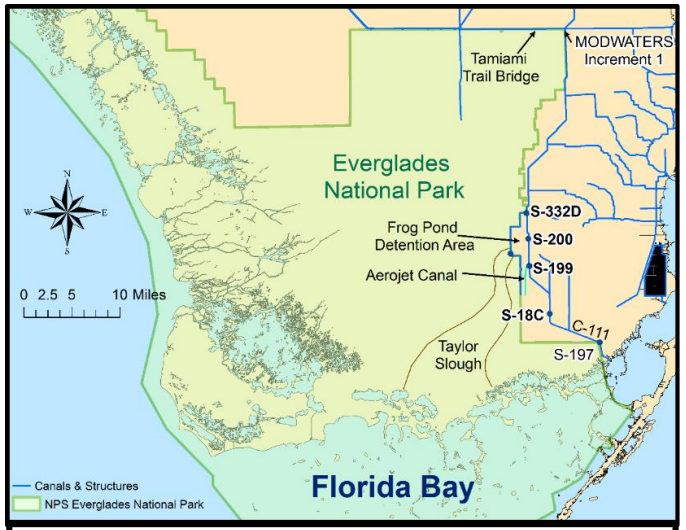
Getting Water to Florida Bay

ModWater
- One Mile Bridge
- S-356 Pump Station
- 8.5 Square Mile Flood Mitigation
- Increment 1 Field Test- ready to operate

C-111 West Spreader Canal Project
- Frog Pond Detention Area-S-200 pump station
- Aerojet Canal Extension S-199 pump station

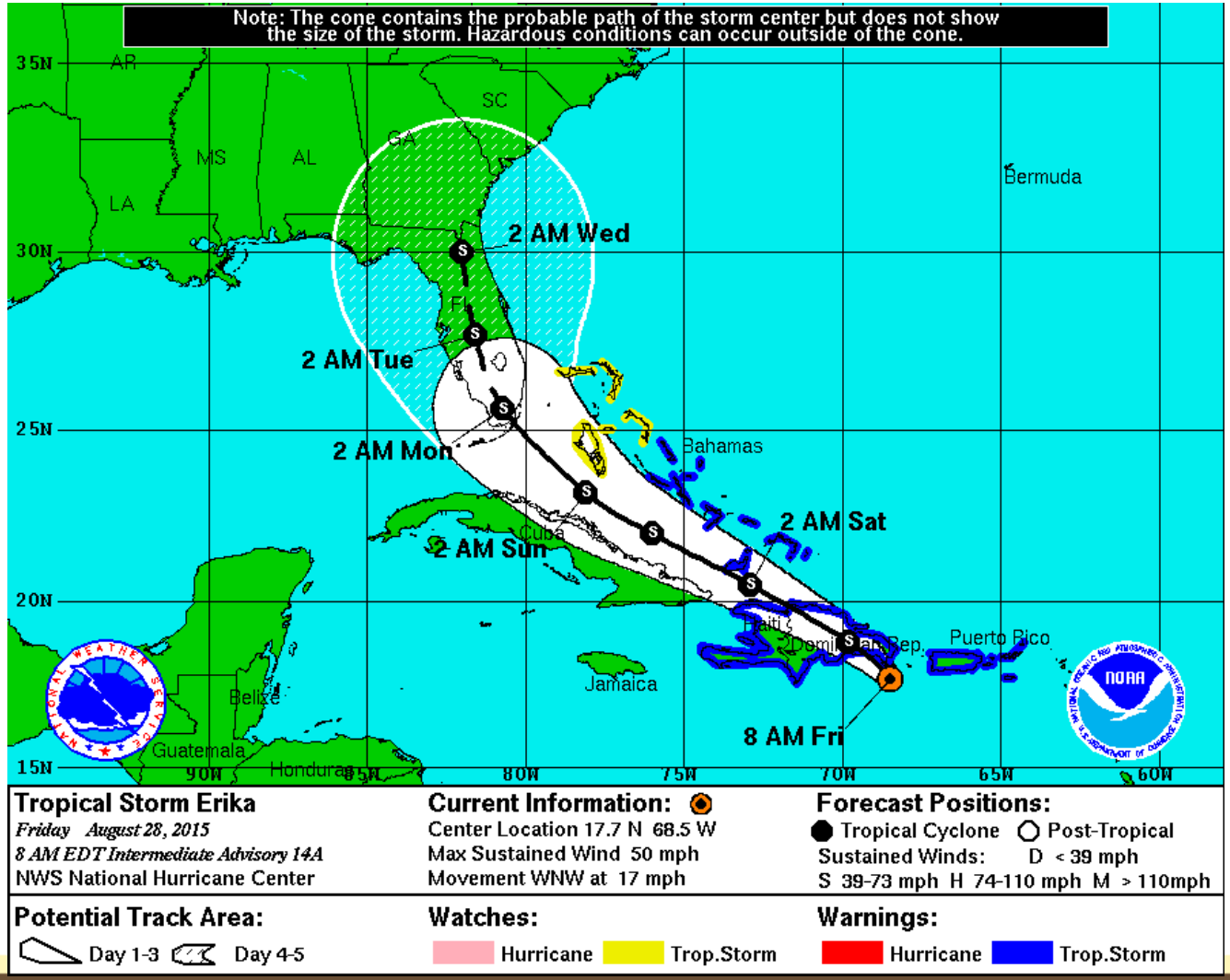
Tamiami Trail Next Steps- 2.6 Mile Bridge
- FDOT and ENP- advertising for Design-Build

C-111 South Dade
- S-332 pump stations
- Detention areas
- Taylor Slough Bridge
- Degrading southern C-111 Levee
- Northern Detention - Contract 8 FY16 construction

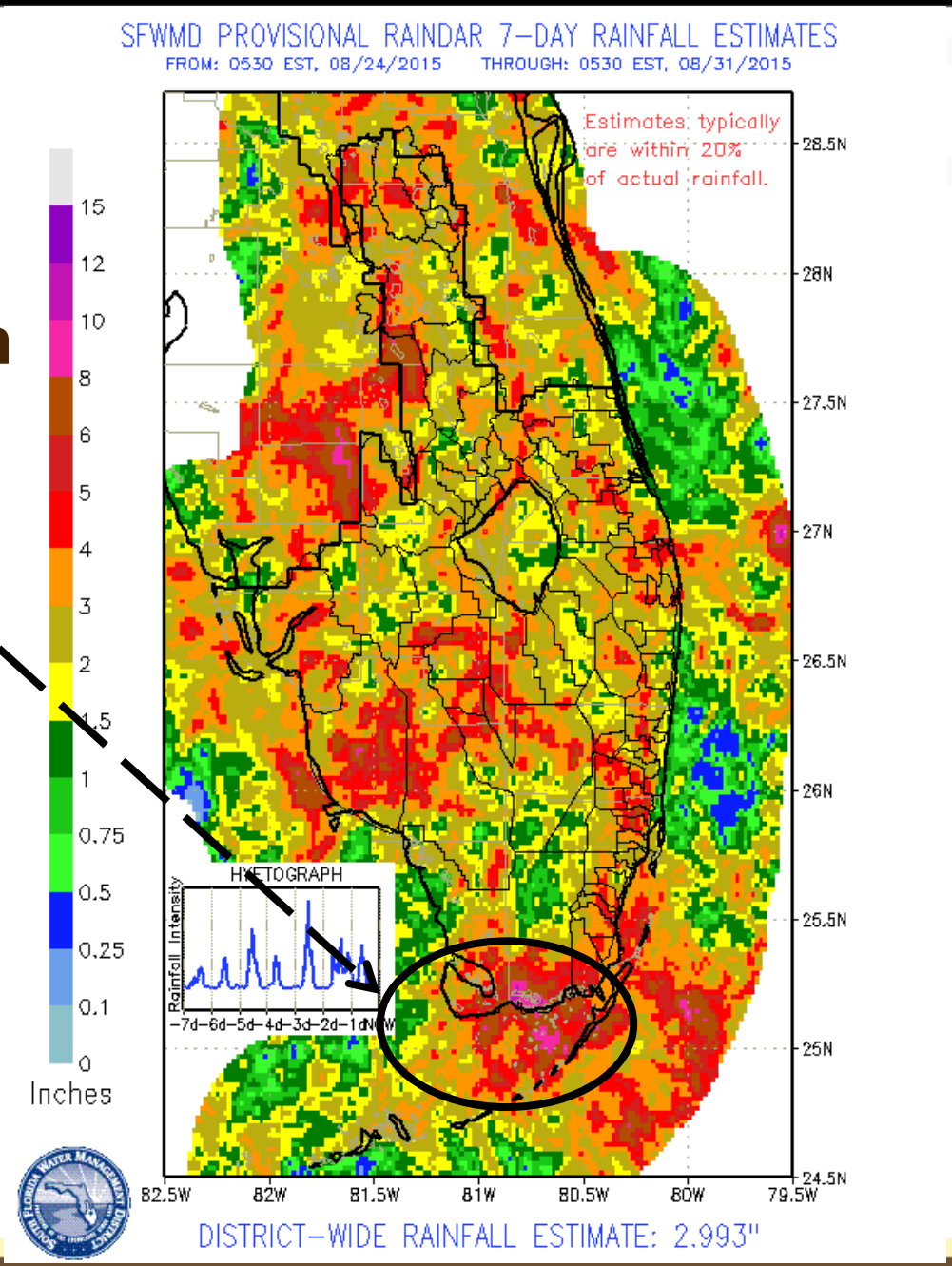


At this point in the drought, water management operations cannot solve the problem in the short term, but what about longer term?

TROPICAL STORM ERIKA WOULD HAVE MADE A DIFFERENCE



The Past Weekend Rainfall: Did it make a difference?



Thank You for Your Attention

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